

REMARKS

In response to the Examiner's Action mailed on October 7, 1999, claims 1 to 6 are amended and claims 7 to 21 are added. The applicant hereby respectfully requests that the patent application be reconsidered.

An item by item response to Examiner's objections or rejections is provided in the followings:

1-2 Claims Rejection under 35 USC § 102(b)

The Examiner rejects claim 1, under 35 USC§102(b) as being anticipated by Mok (5,703,753 dated 12/30/97). According to the Examiner Mok shows the method as claimed in Figs. 1-12 with corresponding text. Mok discloses a mounting assembly for a mulitple chip module 13 or other circuit module, which includes a printed wiring board 11 having a surface including an array of board contacts 23, a thermally conductive base 15, a first substrate, a second substrate, conductors 21 connecting the interconnect structure 12, a connector between the board and the second substrate, a heat spreader assembly 14 and a fastener which fastens the thermally conductive base 15 to the board and to the hear spreader assembly 14.

In response to Examiner's rejection, claim 1 is amended to direct to an integrated multiple-substrate-on-chip-module (MSOCM) assembly. This CSP-ready MSOCM assembly includes:

- a) a chip-size package (CSP)-ready MSOCM board having a top surface and a bottom surface, said CSP-ready MSOCM board includes a plurality of board bonding-wire windows and said [top surface] CSP-ready MSOCM board further includes a plurality of board-bonding-pads disposed on said top surface of said CSP-ready MSOCM board near said bonding-wire window;
- b) an adhesive layer disposed beneath said CSP-ready MSOCM board having also having a plurality of adhesive-layer bonding wire windows corresponding to and aligned with said board bonding wire windows on said MSOCM board;

- c) a plurality of integrated circuit (IC) chips mounted onto said adhesive layer under said bottom surface of said CSP-ready MSOCM board with each of said IC chips provided with a plurality of chip bonding pads facing an open space defined by said board bonding wire windows;
- d) a plurality of bonding wires disposed in said space defined by said board and adhesive-layer bonding-wire windows and interconnected between each of said chip bonding pads and a corresponding board bonding pad disposed on said top surface of said CSP-ready MSOCM board; and
- e) a CSP-ready land-grid array comprising a plurality of land-grid contact pads disposed on said top surface of said CSP-ready MSOCM board wherein said plurality of land-grid contact pads are arranged to have a standard CSP-footprint of said IC chips whereby each of said IC chips mounted onto said CSP-ready MSOCM board is provided to be separated into an individual CSP package.

The newly added limitation that the MSOCM assembly includes a CSP-ready land grid array that further includes a plurality of land-grid contact pads. The contact pads are arranged to have a standard CSP-footprint of the IC chips whereby each of the IC chips mounted onto the CSP-ready MSOCM board is provided to be separated into an individual CSP package

Mok does not disclose such a CSP-ready land grid array disposed on the top surface of the CSP-ready MSOCM board as now included in the amended claim 1. With the newly added limitations, the amended claim is novel and not obvious under Mok and would be allowable as a patented claim over the cited prior art references.

3-4 *Claims Rejection under 35 USC § 103(a):*

The Examiner rejects claims 2 to 6 under 35 USC§103(a) as being unpatentable over Mok (US 5,703,753) in view of Otsuka (5,949,142 dated 9/7/99) and Inoue (5,909,010, date 6/1/99). Mok shows the device as stated in the above rejection. Mok does not show a ship size package. Otsuka discloses a chip size package constituted by a chip 2 on which an integrated circuit is formed and plated bumps 2a are formed at terminal

portions of the integrated circuit. A flexible two-layered printed circuit board 4 having inter-level conductive bumps 4c for electrically connecting metal patterns 4a formed on the two surfaces of the flexible board and an anisotropic conductive film 6 for electrically connecting the plated bumps arranged on the chip.

In response to Examiner's rejection, claims 2 and 6 are amended and claims 7 to 10 are added. The claim 2 is amended to direct to an MSOCM assembly wherein said CSP-ready MSOCM board and said adhesive layer further include a plurality CSP-ready separation lines dividing each said IC chips mounted onto said bottom surface of said CSP-ready MSOCM board for separating said MSOCM assembly into a plurality of standard individual CSP packages each contain one of said IC chips.

A combination of Mok (US 5,703,753) in view of Otsuka (5,949,142 dated 9/7/99) and Inoue (5,909,010, date 6/1/99) would not enable a person of ordinary skill in the art to devise an assembly as now provided in the amended claim 2. None of these cited prior references disclose or suggest that a multiple chip module assembly that has structural feature ready to separate into a plurality of standard individual CSP packages. The amended claim 2 would be therefore not obvious over these prior art references.

Further more claims 3 to 7 are amended to direct to MSOCM assembly that includes additional limitations. Specifically, in claim 3:

said CSP-ready MSOCM board further includes a plurality of via connectors penetrating said CSP-ready MSOCM board and in electrical connection with a plurality of said chip bonding pads via metal traces disposed on said bottom surface of said MSOCM board; and each of said via connectors further being in electric connection with one of said land grid contact pads disposed on said top surface of said MSOCM board.

In the amended claim 4:

said land grid array comprising said plurality of land grid contact pads constituting CSP-ready solder pads are insulated by a plurality of solder masks disposed between said land grid contact pads.

In the amended claim 5, the MSOCM assembly further comprising:

a plurality of solder balls, each mounted on [a plurality] one of said land grid contact pads on said top surface of said CSP-ready MSOCM board.

In the amended claim 6, the MSOCM assembly further comprising:

a plurality of testing pins including a set of burn-in test pins and a set of board level test pins disposed on an edge of said CSP-ready MSOCM board provided for conducting a plurality of burn-in and board level tests.

In the newly added claim 7:

each of said board bonding-wire windows further comprising a bigger opening near said top surface of said CSP-ready MSOCM board wherein an interface between said bigger opening and a smaller opening at a bottom portion of said board bonding-wire window providing a platform for disposing said board bonding-pads thereon.

In the newly added claim 8, the MSOCM assembly further comprising:

a liquid encapsulation filler filling each of said board bonding-wire windows; and

each of said board bonding-wire windows further comprising a liquid encapsulation dam disposed on said top surface of said CSP-ready MSOCM board surrounding said board bonding-wire window for keeping said liquid encapsulation filler from flowing outside of said liquid encapsulation dam.

In the newly added claim 9:

said CSP-ready MSOCM board is a metal core CSP-ready MSOCM board.

In the newly added claim 10:

said CSP-ready MSOCM board is a laminated multiple-layered board;
and

said CSP-ready MSOCM board further having a plurality of built-in passive circuit elements supported on said CSP-ready MSOCM board.

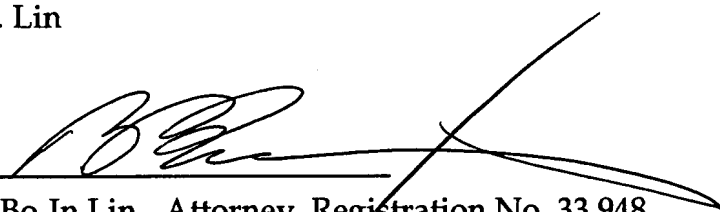
Again, a combination of Mok (US 5,703,753) in view of Otsuka (5,949,142 dated 9/7/99) and Inoue (5,909,010, date 6/1/99) would not enable a person of ordinary skill in the art to devise an assembly as now provided in the amended claim 3 to 10. None of these cited prior references disclose or suggest that a multiple chip module assembly that has structural feature ready to separate into a plurality of standard individual CSP packages as now explicitly claimed in the amended claim 1 upon this amended claim, claims 3 to 7 are dependent. The amended claim 3 to 7 and the added claims 8 to 10 would be therefore not obvious over these prior art references.

Similarly, the added claims 11 to 21 are provided with same structural limitations as now included in the amended and newly added claims 1 to 10. Claims 11 to 21 would also be novel, non-obvious and allowable as patented claims.

With the amended and the newly added claims, and the reasons provided above, the Applicants hereby respectfully urge that the Examiner would withdraw the 35 USC§ 102 and 35 USC§ 103 rejections, such that the present application can be reconsidered and allowed.

Respectfully submitted
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By



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PCB
FR4 glass-epoxy
Vipac BGA by Prolinx
BT Resin laminate

BT - Basin
Bonding wire window: 20-60 m/s width
15-300 m/s length

103

120

107

109

105

130'-1

130'-2

130'-3

130'-1

130'-2

130'-3

built-in passive component

separate line

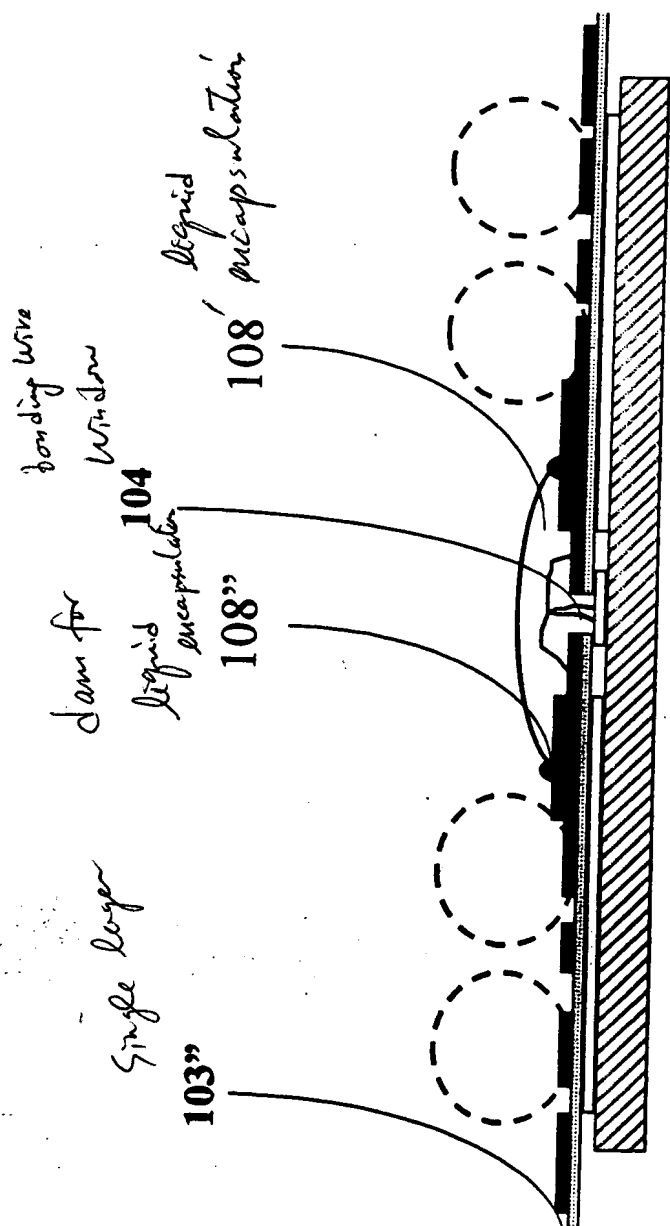


Fig. 1C